

---

---

# **COMMODORE**

---

## ***DISK DRIVE*** **1570 / 1571**

---

---

### **Technical Manual**

---

WD 1770

1	CS	:	Low selectiert den Chip
2	R/W	:	high schreiben/low lesen
3	AQ	:	Diese zwei Eingänge selectieren interne Register CS ist low
4	A1		
		A1    AO    R/W=1              R/V = 0	
		0        0    Status Reg. Command Reg	
		0        1    Track Reg.    Track Reg.	
		1        0    Sector Reg. Sector Reg.	
		1        1    Data Reg.    Data Reg	
5-12	D0-07	:	Acht bit bi-Datenbus (TTL)
13	Reset	:	Status Reg. wird aktiviert
14	Masse		
15	+5V		
16	Step	:	17 Direction
18	clock	:	8MHz $\pm$ 1 %
19	read Data	:	Low aktiv enthält clock und Datenimpulse von der Drive
20	Motor on	:	aktive High (spindle Motor)
21	write Gate	:	Daten gültig für Diskette
22	write Data	:	MFM Daten auf Disk schreiben
23	Track 00	:	24 Index Pulse
25	write Protect	:	Low verhindert Schreibvorgang
26	Double Dessimity enable	:	Low double Dessimity ist selectiert
27	Data Request	:	Output = Datenregister ist voll beim Lesen, leer beim Schreiben
28	Interrupt Request	:	Output = wird nach jedem Befehl oder Reset gesetzt = Status Reg. Leser

WD 1770 FDG

wird beim Schreiben/Lesen von der Diskette in MFM Format benutzt

Read/Write Hybrid

Schreib/Lese-Verstärker

Digital-Analog Umwandlung

Steuerung des Steppermotors

## Floppy 1571

### Allgemeines

Das System arbeitet mit einem 6502 Prozessor, der mit einer Taktfrequenz von 1 oder 2 MHz gespeist wird.

Das DOS ist in einem 32K ROM enthalten. Als Schreib-Lese-Speicher wird ein 2K x 8 statisches RAM benutzt.

Die Ports gleichen denen der 1541

Wenn das System eingeschaltet wird, erscheint es im 1541 Modus. Der Takt hat eine Frequenz von 1 MHz und alle benutzten Controller, und DOS-Routinen gleichen denen des 1541 Modus.

Wenn die Floppy einen schnellen Datentakt auf dem seriellen Bus erkennt, wechselt der Modus zur 1571. In diesem Modus wird der Takt auf 2 MHz erhöht und die Controller und DOS Routinen des 1571-Modus werden benutzt.

GCR Datenübertragung wird in zwei Gate Arrayes ( 64 H 156, 64H 157) ausgeführt.

MFM Datenübertragung wird vom WD-Controller 1770 ausgeführt. Daten, die im MFM-Mode transportiert werden, werden direkt über den Datenbus zum WD 1770 gesendet.

## Inhaltsverzeichnis

### A. Allgemeines

Technische Daten	3
Unterschied 1570/1571	4
Diskettenformate	6
Serieller Bus	8
Geräteadresse	9
Diskettenbefehle	10

### B. Schaltpläne

Netzteil 1570	11
Platine 1570/1571	12

### C. Testsoftware 13-28

### D. Ersatzteile

## TECHNISCHE DATEN

### GCR-Format

	Einseitig	Doppelseitig
Kapazität (unformatiert)	252019 Bytes	252019*2 Bytes
Kapazität (formatiert)	174848 Bytes	349696 Bytes
Maximale Größe einer sequentiellen Datei	168656 Bytes	337312 Bytes
Maximale Größe einer relativen Datei	167132 Bytes	167132 Bytes
Einträge pro Datei	65535	65535
Dateien pro Diskette	144	144
Spuren pro Diskette	35	70
Sektoren pro Spur	17-21	17-21
Sektoren pro Diskette	683 insgesamt	1366 insgesamt
Bytes pro Sektor	664 frei	1328 frei
	256	256

### MFM-Format

Kapazität (unformatiert):	500000 Bytes pro Seite
Kapazität (formatiert):	
Sektorgröße 128	133120 Bytes pro Seite
Sektorgröße 256	163840 Bytes pro Seite
Sektorgröße 512	184320 Bytes pro Seite
Sektorgröße 1024	204800 Bytes pro Seite
Maximale Anzahl der Spuren	40 pro Seite
Sektoren pro Spur	
Sektorgröße 128	26
Sektorgröße 256	16
Sektorgröße 512	9
Sektorgröße 1024	5

### BENUTZTE CHIPS

6502A	Mikroprozessor
6522	
6526	
23256	ROM mit 32K Bytes
4016	RAM mit 2K Bytes
64H156/64H157	Gate Array
R/W-Hybridschaltkreis	Anologschaltung (MFM, GCR)
WDC 1770	Disk-Controller

### ABMESSUNGEN

Höhe	76 mm
Breite	216 mm
Tiefe	346 mm
Gewicht	3,5 kg

### BETRIEBSDATEN

Spannung	220 V Wechselspannung
Frequenz	50 Hz
Leistungsaufnahme	25 W

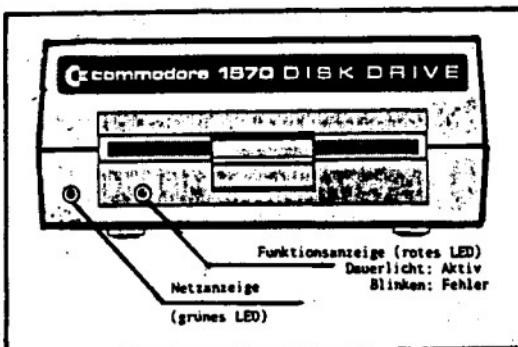
### DATENTRÄGER

Jede hochwertige 5½"-Diskette kann benutzt werden. (Die Verwendung von Commodore-Disketten wird empfohlen.)

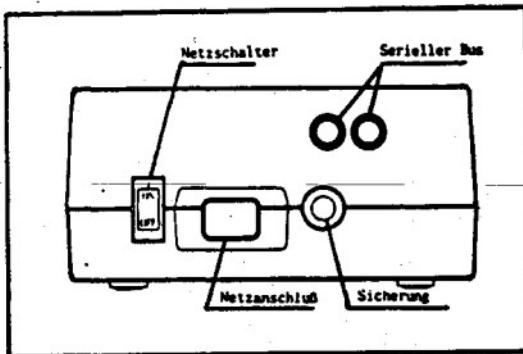
# COMMODORE 1570 DISK DRIVE

## Unterschiede zur 1571

Die Commodore 1570 Diskettenstation verfügt über ein Laufwerk mit einem Klappenverschluß.



FRONTPLATTE



RÜCKSEITE

## Betriebssystem

Die 1570 arbeitet mit dem Commodore DOS, Version 3.0/1570. Eine entsprechende Meldung erhalten Sie unmittelbar nach dem Einschalten bei der Abfrage des Floppyfehlertankals. ("PRINT DS\$" bei BASIC 7.0)

Die 1570 arbeitet im Gegensatz zur 1571 mit nur einem Schreib-/Lesekopf. Alle Angaben im Handbuch der 1571, die sich auf doppelseitig genutzte Disketten beziehen ("doppelseitig", "pro Seite", "1571-Modus" bei BAM, etc.) gelten nicht für die 1570.

## **Geräteadresse**

Die Geräteadresse kann sowohl soft- als auch hardwaremäßig geändert werden. Die softwaremäßige Änderung erfolgt wie im Handbuch der 1571 beschrieben; die DIP-Switches für die hardwaremäßige Umstellung sind nach dem Öffnen des Gehäuses auf der rechten Seite der Leiterplatte über dem Laufwerk zu erreichen. Um Auseinandersetzungen über Garantieansprüche zu vermeiden, sollte ein Umstellen der Schalter nur von einem Commodore-Fachhändler vorgenommen werden.

## **Technische Daten**

Mikroprozessor 6502

2 K RAM

32 K ROM (integriertes DOS)

Serieller Bus, kompatibel zu allen Commodore-Homecomputern.

### **Diskettenformate:**

Commodore Standard (GCR, Single Sided, Single Density)

Speicherkapazität: 170 KB (formatiert)

Spuren pro Diskette: 35

Sektoren pro Spur: 17 bis 21, je nach Lage

Sektoren pro Diskette: insgesamt 683, 664 frei für den Anwender

Bytes pro Sektor: 256

### **MFM-Formate:**

Speicherkapazität:

- bei 128 Bytes/Sektor: 130 KB

- bei 256 Bytes/Sektor: 160 KB

- bei 512 Bytes/Sektor: 180 KB

- bei 1024 Bytes/Sektor: 200 KB

Spuren pro Diskette: max. 40

Sektoren/Spur:

- bei 128 Bytes/Sektor: 26

- bei 256 Bytes/Sektor: 16

- bei 512 Bytes/Sektor: 9

- bei 1024 Bytes/Sektor: 5

### **Datenträger:**

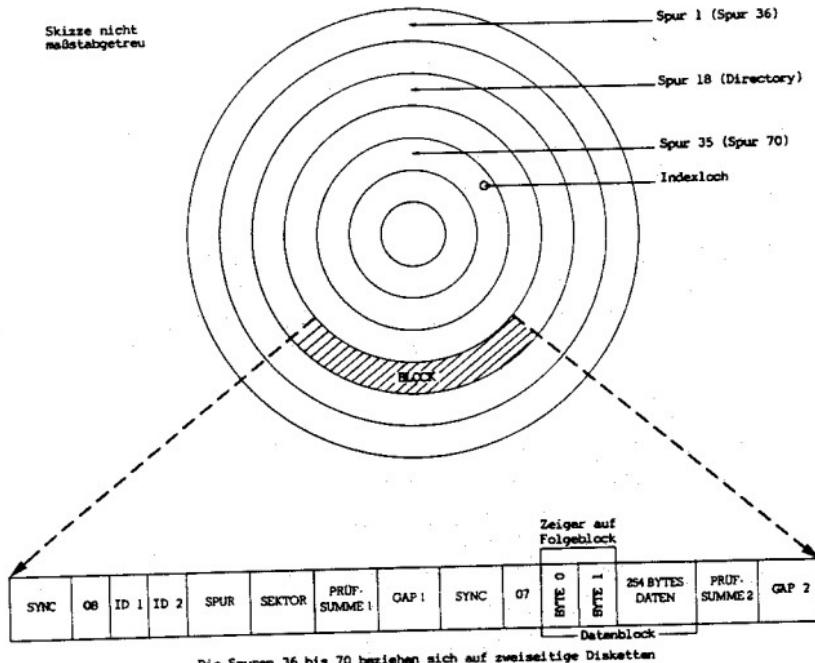
Jede hochwertige 5-1/4-Zoll-Diskette kann verwendet werden. Commodore-Disketten werden empfohlen.

Maße: 97 mm x 200 mm x 374 mm (H x B x T)

Spannungsversorgung: 220 V, 50 Hz

Leistungsaufnahme: 25 W

## DISKETTENFORMATE



GCR-formatierte Diskette

Die Pin-Belegung der Buchse für den seriellen Bus geht aus folgender Tabelle hervor:

Pin-Nummer	Signal	Richtung	Beschreibung
Pin 1	SRQ (Serviceanforderung)	I/O	Wird vom schnellen seriellen Bus als schnelle Takteleitung in beiden Richtungen benutzt. Wird von dem langsamen seriellen Bus nicht verwendet.
Pin 2	GND (Erde)	I	Masse
Pin 3	ATN	I/O	Der Rechner setzt dieses Signal auf den Logikpegel Low und löst damit einen Interrupt auf der Steuerplatine ab. Daraufhin wird die Geräteadresse auf der Datenleitung gesendet. Antwortet keines der angeschlossenen Peripheriegeräte daraufhin innerhalb einer bestimmten vorgegebenen Zeit, so geht der Sender (Rechner) davon aus, daß das adressierte Gerät nicht am Bus angeschlossen ist.
Pin 4	CLK (Takt)	I/O	Dieses Signal wird für die zeitliche Steuerung der Daten benutzt, die auf dem langsamen seriellen Bus gesendet werden (Softwaretakt).
Pin 5	DATA	I/O	Die Daten auf dem seriellen Bus werden softwaremäßig getaktet Bit für Bit übertragen.
Pin 6	RESET		Dieses Signal bewirkt einen RESET des Peripheriegerätes nach einem RESET des Rechners.

### **Format von Spur und Sektor**

Spuren	Vorhandene Sektoren	Anzahl der Sektoren	
1 bis 17	0 bis 20	21	
18 bis 24	0 bis 18	19	1541-
25 bis 30	0 bis 17	18	Modus
31 bis 35	0 bis 16	17	
36 bis 52	0 bis 20	21	
53 bis 59	0 bis 18	19	
60 bis 65	0 bis 17	18	
66 bis 70	0 bis 16	17	

## ÄNDERUNG DER GERÄTEADRESSE

### Hardware-Methode

Mit zwei DIP-Switches auf der Rückseite der 1571 kann die Geräteadresse der 1571 geändert werden. Mit einem Schraubenzieher, Bleistift oder einem anderen kleinen Werkzeug können die Schalter entsprechend eingestellt werden. In der folgenden Tabelle werden die für jede Geräteadresse erforderlichen Einstellungen angegeben.

Links	Rechts	Geräteadresse
Oben	Oben	8
Unten	Oben	9
Oben	Unten	10
Unten	Unten	11

## TABELLE DER DISKETTENBEFEHLE

### BASIC 2.0

Allgemeines Format: OPEN 15,8,15;PRINT#15,befehl:CLOSE 15

### VERWALTUNGSBEEFHELE

BASIC 2.0	NEW	"N0:diskettenname,id"
	COPY	"C0:neue datei=0:alte datei"
	RENAME	"R0:neuer name=alter name"
	SCRATCH	"S0:dateiname"
	VALIDATE	"V0"
BASIC 7.0 (BASIC 3.5)	NEW	HEADER "diskettenname",id,D0
	COPY	COPY "alte datei" TO "neue datei"
	RENAME	RENAME "alter name" TO "neuer name"
	SCRATCH	SCRATCH "dateiname"
	VALIDATE	COLLECT
BASIC 2.0, 3.5, 7.0	INITIALIZE	"I0"

### DATEIBEEFHELE

BASIC 2.0	LOAD	LOAD "dateiname",8
	SAVE	SAVE "dateiname",8
	VERIFY	VERIFY "dateiname",8
BASIC 7.0/3.5	LOAD	DLOAD "dateiname"
	SAVE	SAVE "dateiname"
	VERIFY	DVERIFY "dateiname" (nur BASIC 7.0)
Binärdatei (nur BASIC 7.0)	BLOAD	BLOAD "dateiname",Bbank,Pstartadresse
	BSAVE	BSAVE "dateiname",Bbank,Pstartadresse TO endadresse+1
	BOOT	BOOT "dateiname"
	OPEN	DOPEN#datei#, "dateiname" [,Leintragslänge] [.W]
	CLOSE	DCLOSE#datei#
	RECORD#	RECORD#, datei, eintragsnummer [,offset]

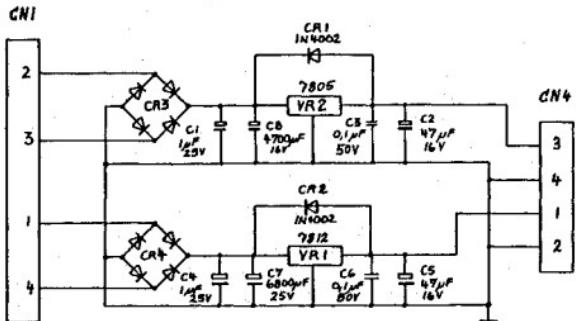
BASIC 2.0, 3.5, 7.0	OPEN	OPEN datei,gerat,kanal,"0:dateiname,dateityp, richtung"
	CLOSE	CLOSE datei
	RECORD#	"P" + CHR\$(kanal) + CHR\$(<eintrag) + CHR\$(>eintrag) + CHR\$(offset)
	PRINT#	PRINT# datei, datenliste
	GET#	GET# datei, variablenliste
	INPUT#	INPUT# datei, variablenliste

### BEFEHLE FÜR DEN DIREKTZUGRIFF

BLOCK-ALLOCATE	"B-A";0;spur#;sektor#
BLOCK-EXECUTE	"B-E";kanal#;0;spur#;sektor#
BLOCK-FREE	"B-F";0;spur#;sektor#
BUFFER-POINTER	"B-P";kanal#,byte
BLOCK-READ	"U1";kanal #;0;spur;sektor#
BLOCK-WRITE	"U2";kanal #;0;spur#;sektor#
MEMORY-EXECUTE	"M-E"CHR\$(<adresse)CHR\$(>adresse)
MEMORY-READ	"M-R"CHR\$(<adresse)CHR\$(>adresse)CHR\$(anzahl)
MEMORY-WRITE	"M-W"CHR\$(<adresse)CHR\$(>adresse)CHR\$(anzahl)CHR\$ (datenbyte)CHR\$(datenbyte)...
USER	"Uzeichen"
UTILITY LOADER	"&0:dateiname"

## REVISIONS

LTR	ZONE	DESCRIPTION	DATE	APPROVED
0	A	ADVANCED ENGINEERING RELEASE PRODUCTION RELEASE		



UNLESS OTHERWISE SPECIFIED			DRAWN BY:	DATE
TOLERANCES ON DECIMALS			Negele	9-2-85
X	XX	XXX	CHKD:	9-2-85
S	S	S	ENGRD:	
MATERIAL: /			USED ON	NEXT ASSY
FINISH: /			1570	
SIZE B		325.118		REV A
SCALE NONE		SHEET 1 OF 1		

commodore

SCHEMATIC

POWER SUPPLY 1570

COMMODORE MODEL 1571

## SINGLE DISK DRIVE

PRELIMINARY

## **DIAGNOSTIC MANUAL**

VERSION VP-3.1

SEPTEMBER 19, 1985

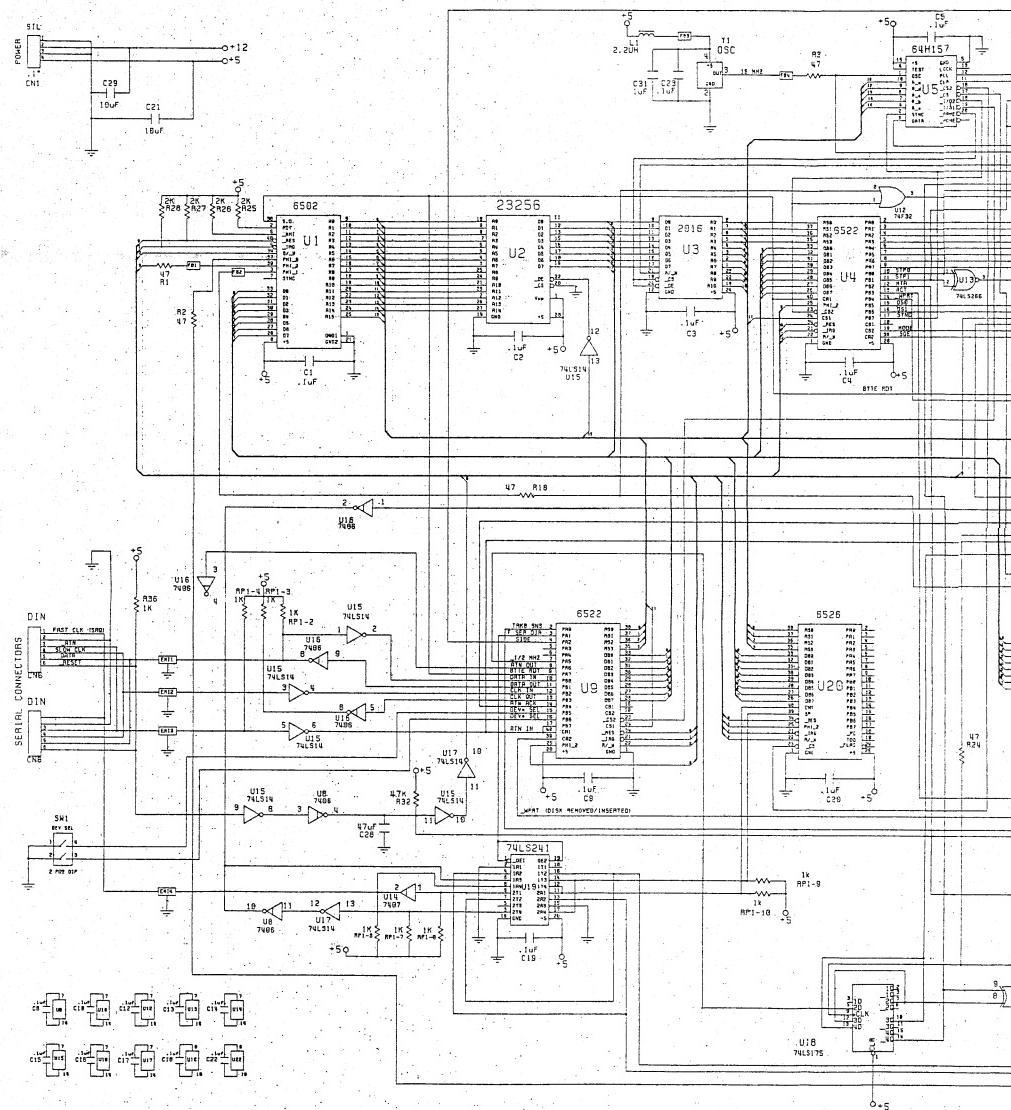
VERSION VP-1.3 TEST DISKETTE INTRODUCTION

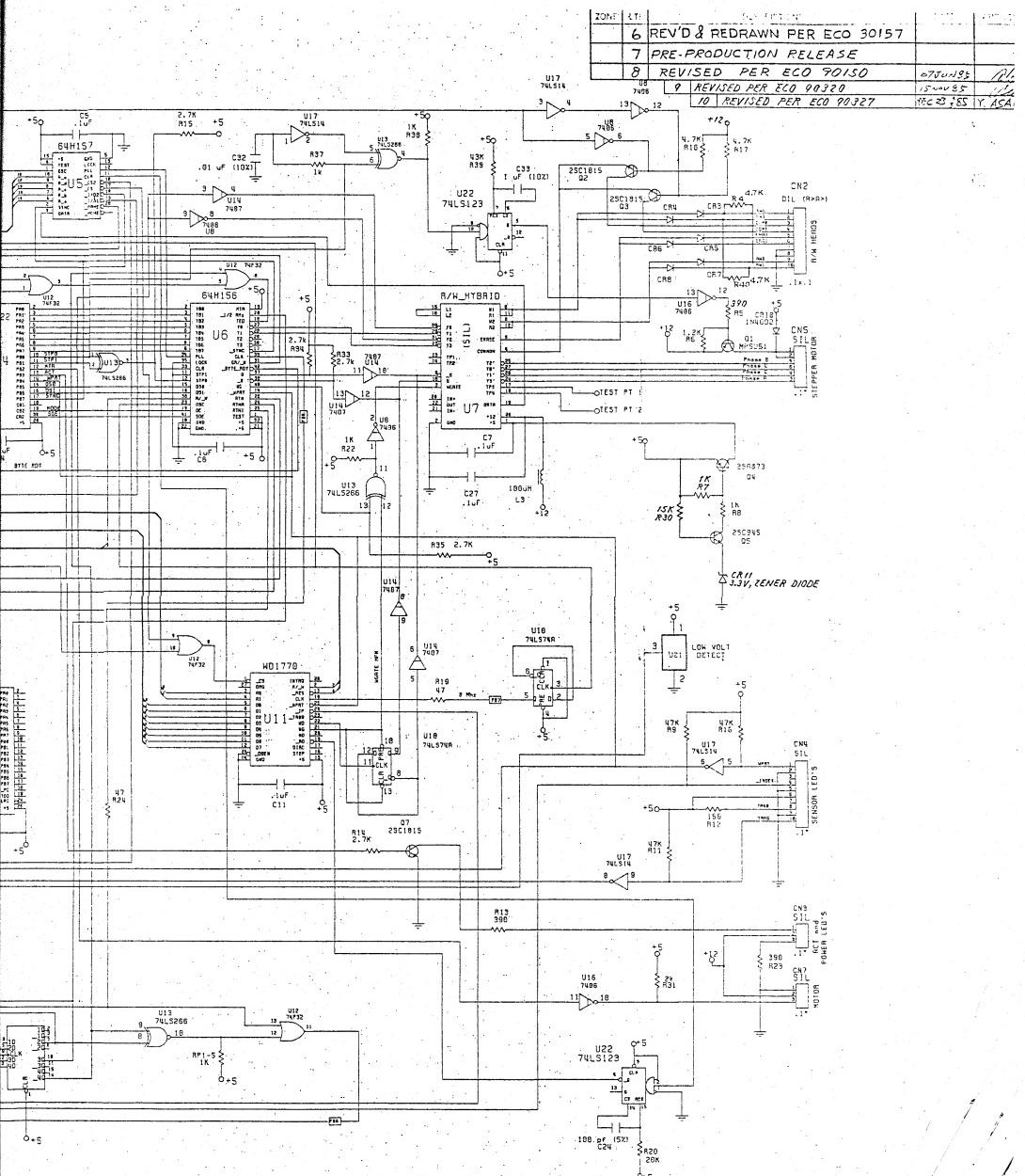
\*\*\*\*\*  
\*\*  
\*\* THIS MANUAL ALONG WITH THE TESTS ARE A PRELIMINARY VERSION. WHEN FINAL \*\*  
\*\* TESTS ARE COMPLETED THEY WILL BE RELEASED ALONG WITH THE FINAL MANUAL \*\*  
\*\*  
\*\*\*\*\*

The below listing is the directory of the Version VP-1.3 Test Diskette and a brief explanation of each program. More detailed information is contained inside this manual.

Disk Name -- 1571 Test VP-1.3

PGM 1 - "Menu VP-1.3"	** Diagnostic Test Menu for 1571 Test VP-1.3 Disk
PGM 2 - "Performance Bin"	** Binary File loaded prior to Performance Test
PGM 3 - "Performance Test"	** Performance Read/Write Test for the 1571
PGM 4 - "Read/Write Bin"	** Binary File loaded prior to Read/Write Test
PGM 5 - "Read/Write Test"	** Read/Write Test for the 1571
PGM 6 - "System Test Bin1"	** Binary File loaded prior to the System Test
PGM 7 - "System Test Bin2"	** Binary File loaded prior to the System Test
PGM 8 - "System Test"	** System Test for the 1571
PGM 9 - "Final Test Bin"	** Binary File loaded prior to the Final Test
PGM 10 - "Final Test"	** Final Test for the 1571
PGM 11 - "R/W Burn-in"	** Extended Read/Write Test for the 1571
PGM 12 - "Alignment Inst"	** Instructions to run the Alignment Test
PGM 13 - "Alignment Test"	** Alignment Test - C-64/1541 Mode Only





**commodore**  
**SCHEMATIC**  
**STAND ALONE**  
**ISK DRIVE**

621 D 310501 10  
SCALE ~~W~~ SHEET 1 OF 1

TABLE OF CONTENTS

Menu VP-1.3	-----	Page 1-1
Performance Test	-----	Page 2-1
Read/Write Test	-----	Page 3-1
System Test	-----	Page 4-1
Final Test	-----	Page 5-1
Logic Diagnostic	-----	Page 6-1
Read/Write Burn-In	-----	Page 7-1
Alignment Test	-----	Page 8-1

MENU VP-1.3

DESIGNED TO                    AUTO-BOOT THE DIAGNOSTIC TESTS

REQUIRED EQUIPMENT            C-128 COMPUTER  
                                  1571 SINGLE DISK DRIVE  
                                  40, 80 COLUMN MONITOR OR TV SET  
                                  VERSION VP-1.3 TEST DISKETTE

\*\*\*\*\*  
\*\*  
\*\* YOU MUST USE DOUBLE SIDED - DOUBLE DENSITY DISKETTES FOR ALL TESTS \*\*  
\*\*  
\*\*\*\*\*

To load the diagnostic menu the following steps must be implemented..

1. Insert Test Disk Version VP-1.3 Into the 1571
2. Hold Down the 'SHIFT KEY' and Press the 'RUN/STOP KEY'

When the program is loaded select the following..

1. Press '4' if you are using a 40 column monitor or a TV set
2. Press '8' if you are using a 80 column monitor

When the monitor selection is made the following option menu is displayed..

1. Press '1' - To Load The Performance Test     -- See Pages 2-1 thru 2-2
2. Press '2' - To Load The Read/Write Test     -- See Pages 3-1 thru 3-2
3. Press '3' - To Load The System Test         -- See Pages 4-1 thru 4-3
4. Press '4' - To Load The Final Test          -- See Pages 5-1 thru 5-2
5. Press '5' - To Load The Logic Diagnostic    -- See Page 6-1
6. Press '6' - To Load The Read/Write Burn-in -- See Pages 7-1 thru 7-2
7. Press '7' - To Load The Alignment Inst     -- See Page 8-1

## PERFORMANCE TEST

DESIGNED TO TEST THE 1571 SINGLE DISK DRIVE

REQUIRED EQUIPMENT    C-128 COMPUTER  
                      1571 SINGLE DISK DRIVE  
                      40, 80 COLUMN MONITOR OR TV SET  
                      (1) FORMATTED OR BLANK DISKETTE  
                      VERSION VP-1.3 TEST DISKETTE

When the program is loaded select the following..

1. Press '4' if you are using a 40 column monitor or a TV set
2. Press '8' if you are using a 80 column monitor

When the monitor selection has been made the following must be selected..

1. Press 'F' if the diskette being used for the test is already formatted
2. Press 'U' if the diskette being used for the test is not formatted

If the 'F' (FORMATTED) option was selected..

1. Insert Formatted Diskette
2. Press 'SPACE' to begin the test
3. A Quick Format command is executed  
   \* Only the Header is written to the diskette

If the 'U' (UNFORMATTED) option was selected..

1. Insert Blank Diskette
2. Press 'SPACE' to begin the test
3. A Long Format command is executed  
   \* All Tracks are formatted with an ID written to all Sectors

PERFORMANCE TEST (Cont)

When the Format option is complete the following tests are executed..

1. A file is Opened - A Data File is written - The file is Closed
2. A file is Opened, The Data File is read and verified - The file is Closed
3. The Data File is Scratched from the diskette

The 1541 Slow Mode is checked by..

1. Writing Data to tracks 5 and 35
2. Reading and Verifying written data from tracks 35 and 5

The 1571 Fast Mode is checked by..

1. Writing Data to tracks 40 and 70
2. Reading and Verifying written data from tracks 70 and 40

The MFM Burst Format is checked by formatting..

TRACK	BYTES/SECTOR
1	128
2	512
36	1024
37	256
38	512
39	128

The Burst Read/Write is checked by Writing, Reading and Comparing Data on..

Tracks -- 01,02,36,37,38,39 -- Side 0

Tracks -- 79,78,77,76,42,41 -- Side 1

\*\* A Failure during Burst Operations is normally due to a Bad Diskette or a Double Sided - Double Density Diskette not being used

## READ/WRITE TEST

DESIGNED TO TEST THE 1571 SINGLE DISK DRIVE

REQUIRED EQUIPMENT    C-128 COMPUTER  
                      1571 SINGLE DISK DRIVE  
                      40, 80 COLUMN MONITOR OR TV SET  
                      (1) FORMATTED DISKETTE  
                      VERSION VP-1.3 TEST DISKETTE

When the program is loaded select the following..

1. Press '4' if you are using a 40 column monitor or a TV set
2. Press '8' if you are using a 80 column monitor

When the monitor selection has been made the instructions are displayed..

1. Remove Diagnostic Diskette
2. Insert Formatted Diskette
3. Press 'RETURN' to begin the test

The MFM Format is checked by formatting..

TRACKS	BYTES/SECTOR
00-09	128
10-19	256
20-29	512
30-39	1024

The Read/Write Operation is checked by..

1. Randomly Writing data to tracks 0-39
2. Randomly Reading data from tracks 0-39

## SYSTEM TEST

DESIGNED TO TEST THE 1571 SINGLE DISK DRIVE

REQUIRED EQUIPMENT

- C-128 COMPUTER
- 1571 SINGLE DISK DRIVE (DEVICE 8)
- 1571 SINGLE DISK DRIVE (DEVICE 9) — OPTIONAL
- 40, 80 COLUMN MONITOR OR TV SET
- (1) FORMATTED (WRITE-PROTECTED) DISKETTE
- (1) BLANK DISKETTE
- VERSION VP-1.3 TEST DISKETTE

When the program is loaded select the following..

1. Press '4' if you are using a 40 column monitor or a TV set
2. Press '8' if you are using a 80 column monitor

When the monitor selection has been made the instructions are displayed..

1. Insert Formatted - Write Protected Diskette
2. Press 'SPACE' to begin test

zero Track is checked by executing a five (5) count loop to zero track and reading a pre-written sync mark on the diskette

Write Protect is checked by attempting to format the write-protected diskette and reading back the error channel

When the 'Activity LED Blinking Rapidly' prompt is displayed..

1. Press 'F3' if LED is not rapidly blinking
  - \* SYSTEM FAILS - Bad Write-Protect Sensor
2. Press 'F1' if LED is rapidly blinking
  - \* The Bump Test is Downloaded

The Head Bump checks Track 1 by bumping the head against the Zero Stop five (5) times and checking that the head comes back on track

SYSTEM TEST (Cont)

When all above tests have passed the instructions are displayed..

1. Remove Write-Protected diskette
2. Insert Blank Disk
3. Press 'SPACE' to continue test

Format Operation is checked by executing a GCR Format to all tracks with an ID written to all sectors

When the GCR Format is complete the following tests are executed..

1. A file is Opened - A Data File is Written - File is Closed
2. A file is Opened - The Data File is Read and Verified - File is Closed
3. The Data File is Scratched

The 1541 Slow Mode is checked by..

1. Writing data to tracks 5,15,25,35
2. Reading and Verifying written data from tracks 35,25,15,5

The 1571 Fast Mode is checked by..

1. Writing data to tracks 40,50,60,70
2. Reading and Verifying written data from tracks 70,60,50,40

The MFM Burst Format is checked by formatting..

TRACK	BYTES/SECTOR
1	128
2	512
36	1024
37	256
38	512
39	128

The Burst Read/Write is checked by Writing, Reading and Comparing Data on..

Tracks 01,02,36,37,38,39 -- Side 0  
Tracks 79,78,77,76,42,41 -- Side 1

SYSTEM TEST (Cont)

When the Burst Operations are complete the following instructions should be followed..

1. Remove disk from device (8)
2. Insert in device (9)
3. Press 'R' if no device (9) is present  
\* Skips Compatibility Test
4. Press 'SPACE' to begin compatibility test

The 1541 Slow Mode Compatibility is tested by..

1. Reading and Verifying data from tracks 5,15,25,35

The 1571 Fast Mode Compatibility is tested by..

1. Reading and Verifying data from tracks 40,50,60,70

Burst Read Compatibility is checked by Reading and Verifying Data from..

Tracks - 01,02,36,37,38,39 -- Side 0

Tracks - 79,78,77,76,42,41 -- Side 1

FINAL TEST

DESIGNED TO TEST THE 1571 SINGLE DISK DRIVE

REQUIRED EQUIPMENT    C-128 COMPUTER  
                      1571 SINGLE DISK DRIVE (DEVICE 8)  
                      1571 SINGLE DISK DRIVE (DEVICE 9) — OPTIONAL  
                      40, 80 COLUMN MONITOR OR TV SET  
                      (1) FORMATTED DISKETTE  
                      (1) BLANK DISKETTE  
                      VERSION VP-1.3 TEST DISKETTE

When the program is loaded select the following..

1. Press '4' if you are using a 40 column monitor or a TV set
2. Press '8' if you are using a 80 column monitor

When the monitor selection has been made the option menu is displayed..

1. Press '1' to select Format Option
2. Press '2' to select Read/Write Option
3. Press '3' to display Test Results - After Read/Write Test is complete
4. Press 'A' to execute all the listed options

If '1' is selected - The MFM Format is checked by formatting..

TRACKS	BYTES/SECTOR
00-09	128
10-19	256
20-29	512
30-39	1024

FINAL TEST (Cont)

If '2' is selected - The Read/Write Test is downloaded to the 1571

\*\* When the download is complete the Read/Write Test executes entirely from DOS  
and the 1571 may be disconnected

\*\* If the 'A' (All Options) is selected do not disconnect the 1571

Press 'C' if the C-128 is disconnected  
Press 'R' to return to the option menu

If '3' is selected - The test results are displayed in the following format..

FIRST PASS ERRORS - Displays errors per track for the first test pass

SECOND PASS ERRORS - Displays errors per track for the second test pass

RETRY ERROR COUNT - Displays number of necessary retries

ERROR TYPE - Displays types of errors encountered..

CRC - Data CRC Error  
RNF - Retry Count Not Found  
ADM - Address Mark Not Found

When all test results are displayed..

1. Press 'R' to restart the test
2. Press 'E' to exit from test

## LOGIC DIAGNOSTIC

DESIGNED TO TEST THE 1571 SINGLE DISK DRIVE

REQUIRED EQUIPMENT    C-128 COMPUTER  
                          1571 SINGLE DISK DRIVE  
                          40, 80 COLUMN MONITOR OR TV SET  
                          VERSION VP-1.3 TEST DISKETTE

When the program is loaded select the following..

1. Press '4' if you are using a 40 column monitor or a TV set
2. Press '8' if you are using a 80 column monitor

When the monitor selection has been made instructions are displayed..

1. Connect 1571 to be tested to the C-128
2. Apply Power to the 1571
3. Press 'F1' to begin testing

\*\* A diskette is not needed for this test

When 'F1' has been pressed the Logic Diagnostic Code is downloaded to the 1571

When the download is complete an Activity LED Blinking prompt is displayed..

1. Press 'F3' if LED is not blinking  
   \* Download has failed -- Reset 1571 and retry download
2. Press 'F1' if LED is blinking

If 'F1' has been selected an error flash code chart is displayed. The status of the 1571 logic is indicated by short blinks of the activity LED followed by a long time interval per the following chart..

- 1 - FLASH -- LOGIC IS OK
- 2 - FLASHES -- REPLACE DOS ROM -- PCB LOCATION U02
- 3 - FLASHES -- REPLACE RAM IC -- PCB LOCATION U03
- 4 - FLASHES -- REPLACE 6522 IC -- PCB LOCATION U04
- 5 - FLASHES -- REPLACE 6522 IC -- PCB LOCATION U09
- 6 - FLASHES -- REPLACE 6526 IC -- PCB LOCATION U20
- 7 - FLASHES -- REPLACE WD1770 -- PCB LOCATION U11

When the download is complete the Logic Diagnostic is executing entirely from the 1571 DOS and the C-128 may be disconnected.

Press 'F1' to test more drives  
Press 'F3' to exit from the test

\*\* Once the Logic Diagnostic has been downloaded to a 1571 it is necessary to reset (Turn Off and On) the 1571 before it can be accessed.

### READ/WRITE BURN-IN

DESIGNED TO TEST THE 1571 SINGLE DISK DRIVE

REQUIRED EQUIPMENT C-128 COMPUTER  
1571 SINGLE DISK DRIVE  
40 , 80 COLUMN MONITOR OR TV SET  
(1) FORMATTED OR BLANK DISKETTE  
VERSION VP-1.3 TEST DISKETTE

When the program is loaded select the following..

1. Press '4' if you are using a 40 column monitor or a TV set
  2. Press '8' if you are using a 80 column monitor

When the monitor selection has been made the option menu is displayed..

1. Press 'F' to select the fast test
  2. Press 'S' to select the slow test

When the type of test has been selected the following options are offered...

- #### 1. Select the speed mode of the test

- A. Press '1' to run the test in the 1 MHZ Mode
  - B. Press '2' to run the test in the 2 MHZ Mode
    - \* An 80 Column Monitor is required for 2 MHZ Mode

- ### 3. Select drive mode of the test

- A. Press '4' to run the test in the 1541 Mode
  - B. Press '7' to run the test in the 1571 Mode

3. Select number of passes the test is to run  
\* For extensive testing, 10 Passes is suggested for the Fast Test  
\* For extensive testing, 2 Passes is suggested for the Slow Test

The format operation of the drive is checked by..

1. MFM Format at 128, 256, 512 and 1024 Bytes/Sector  
 \* MFM Format is done in the 1571 Mode only
  2. GCR Format writing a header only with no ID written - Fast Test  
 GCR Format of all tracks with an ID written to all sectors - Slow Test  
 \* GCR Format is done in both 1541 and 1571 Modes

The write operation of the drive is checked by...

1. Three (3) files are saved to the diskette  
\* The files are saved in both 1541 and 1571 Modes

The write operation is verified by..

1. Reading the directory to ensure the three (3) files were properly saved

READ/WRITE BURN-IN .. (Cont)

The Read/Write Operation of the drive is tested by..

1. Reading - Writing - Reading and Verifying - per the following..

Fast Test - 1541 Mode - Tracks - 01,05,10,15,20,25,30,35  
Sectors - 00,08,16

Slow Test - 1541 Mode - Tracks - 01 thru 35  
Sectors - 00 thru 16

Fast Test - 1571 Mode - Tracks - 01,10,20,30,40,50,60,70  
Sectors - 00,08,16

Slow Test - 1571 Mode - Tracks - 01 thru 70  
Sectors - 00 thru 16

The test results are displayed at the end of the test in the following format..

PASSES - Total number of passes run

TOTAL ERRORS - Total errors encountered during all operations

The error list displays all errors on a per operation basis as..

MFM 128 BYTE - Number of errors encountered during the 128 Byte/Sector  
MFM Format Operation

MFM 256 BYTE - Number of errors encountered during the 256 Byte/Sector  
MFM Format Operation

MFM 512 BYTE - Number of errors encountered during the 512 Byte/Sector  
MFM Format Operation

MFM 1024 BYTE - Number of errors encountered during the 1024 Byte/Sector  
MFM Format Operation

GCR FORMAT - Number of errors encountered during the GCR Standard Format  
Operation

FILE SAVE - Number of errors encountered during the Saving File Operation

DIRECTORY - Number of errors encountered during the Directory Read  
Operation

READ - Number of errors encountered during the Read Operation  
\* Includes both Read and Read and Verify Operations

WRITE - Number of errors encountered during the Write Operation

COUNTABLE - Number of Read and Write errors that required more than  
one (1) retry to recover

TOTAL RUN TIME - Total elapsed time since test started

BOTTOM LINE - Final determination if the system Passes or Fails the test

## ALIGNMENT TEST

DESIGNED TO TEST THE 1571 SINGLE DISK DRIVE

REQUIRED EQUIPMENT      C-128 COMPUTER  
                          1571 SINGLE DISK DRIVE  
                          40, 80 COLUMN MONITOR OR TV SET  
                          (1) ALIGNMENT DISKETTE (CBM P/N 970016-01)  
                          (1) FORMATTED DISKETTE  
                          VERSION VP-1.3 TEST DISKETTE

\*\*\*\*\*  
\*\*  
\*\*       THIS VERSION OF THE ALIGNMENT TEST MUST BE LOADED AND RUN       \*\*  
\*\*       WITH THE C-128 IN THE C-64 MODE AND THE 1571 IN THE 1541 MODE       \*\*  
\*\*  
\*\*\*\*\*

When the program is run the following options are available..

1. Press 'SPACE' to run all available tests
  - \* This is the recommended option
2. Press '1' to test for proper drive LED operation (Green Activity LED)
3. Press '2' to test for proper Write Protect Sensor operation
4. Press '3' to check Drive Belt status and display the current Motor Speed
  - \* The speed is out-of-tolerance if the indicated reading is different than (-1ms, 0ms or +1ms)
  - \* If the speed is out of the recommended tolerance adjustment is allowed
5. Press '5' to monitor the 'CATS EYE SIGNAL' for evenness, correct amplitude and adjust if necessary.
  - \* Rotate the Stepper Motor to obtain maximum display per Figure 1-1 & 1-2
  - \* This option requires a special 48TPI alignment disk (CBM P/N 970016-03)

A dual trace scope, with external sync capabilities, will be necessary for proper alignment. The probes must be connected as follows..

PROBE 1 - Pin 17 - IC U7 ----- TPI  
PROBE 2 - Pin 18 - IC U7 ----- TP2  
EXT SYNC - Pin 17 - IC U6

\*\* Scope settings should be adjusted for the best possible display of the 'CATS EYE SIGNAL'

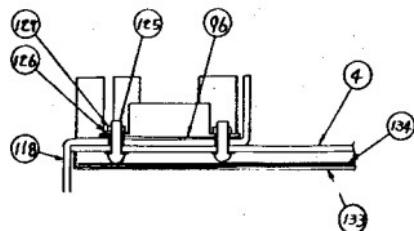
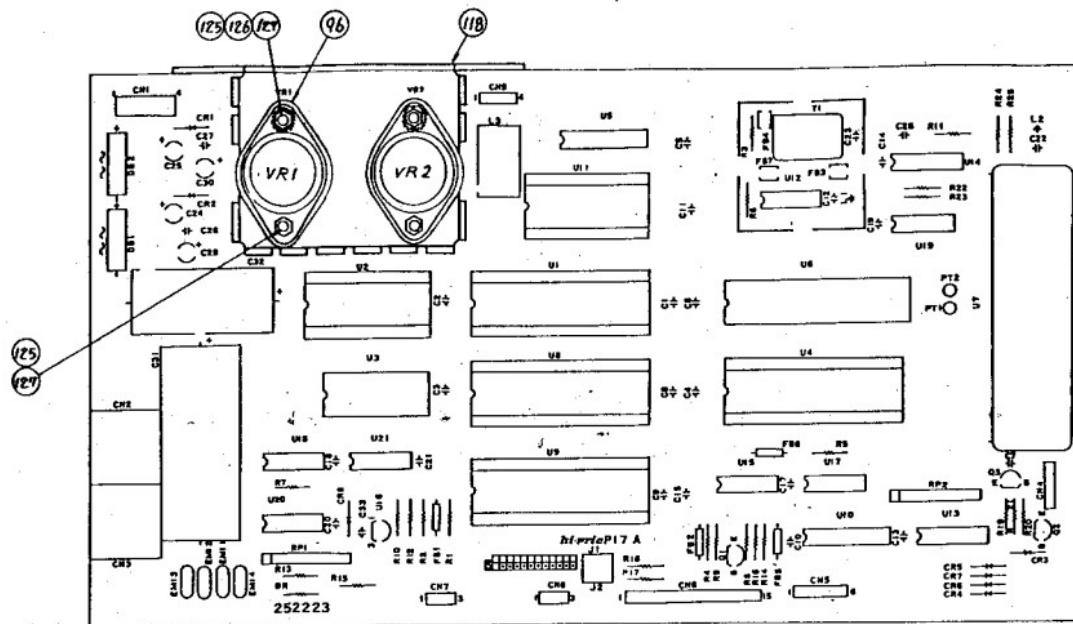
6. Press '6' to do a final Read/Write test on the 1571
  - \* This test reads, writes and verifies data to random tracks
  - \* A known good formatted diskette must be used for the Read/Write test

PCB ASSY SINGLE FLOPPY 1570

Artikel-Nr.	Beschreibung	
252 223-01	PCB SINGLE FLOPPY 1570	
901 435-02	IC 6502 AD 2 MHz CPU	U1
252 242-01	23256 32K x 8 ROM	U2
251 828-01	64H156 CUSTOM GATE ARRAY	U6
251 829-01	64H157 CUSTOM GATE ARRAY	U5
251 853-01	R/W HYBRID	U7
310 651-01	WD-1770 FDC	U11
390 077-01	74F 32	U17
310 653-01	65SC 22A (2MHz)	U4,9
318 011-02	6526 A (2MHz)	U8
251 637-05	2016 (S RAM)	U3
251 853-02	R/W HYBRID	U7
251 828-02	CUSTOM GATE ARRAY	U6
251 637-03	2016 (S RAM 120 ns)	U3
251 637-04	2016 (S RAM 150 ns)	U3
325 566-01	CRYSTAL MODULE 16MHz	Y1
902 410-10	RESISTOR PACK 1 Kn 10PIN	PR1
902 410-12	RESISTOR PACK 2.7 Kn 10PIN	PR2
252 173-01	FERRITE BEADS	FB 3,4,7
251 842-02	EMI FILTER 100pF	EMI 1-4
325 505-02	DIODE ZENER 3.3V 500mW	CR 3
252 239-01	DIODE, SILICON 1A F/4A	CR 1,2,4-7
325 513-01	COIL INDUCTOR 2.2 uH	L1
325 513-03	COIL INDUCTOR 100 uH	L2
251 878-02	LINE FILTER	L3

325 551-01	INSLTATION SILICONE TO-3	VRI.2
325 562-06	HEADER ASSY 3.96 PITCH 6 PIN	CN 5
325 562-15	" 15 PIN	CN 6
325 562-03	" 3 PIN	CN 7. 8
251 065-05	HEADER ASSY 2.5 PITCH 5 PIN	CN 4
252 166-01	CONNECTOR 6 PIN DIN	CN 2. 3
252 233-01	SHIELD PLATE, BOTTOM	
252 234-01	INSULTATION SHEET, 1570	

SEE SHEET 1



UNLESS OTHERWISE SPECIFIED	DRAWN BY:	DATE
TOLERANCES ON	<b>D.Selvayasti</b>	9-12-85
DIMENSIONS	CHD:	
X	ENG'S: S. Selvayasti	9-15-85
XX	APP'D:	
XXX		
C/S		
X A B C Y		
MATERIAL:	USED ON	NEXT ASSY
PEASIN:	1570	250782
SCALE NONE SHEET 1 OF 6		

ERSATZTEILE 1571

Artikel-Nr.	Beschreibung	
250 771-02	BOTTM CASE ASSY, 1571	Ger/UK
252 050-01	KNOB FOR NEWTRONICS & ALPS	
250 770-01	BEZEL ASSY, 1571	
255 052-04	LABEL RATING, 1571	VDE
BOTTOM CASE ASSY		
D 310 509-01	BOTTOM CASE, 1571	
250 772-02	POWER SUPPLY ASSY, 1571	
310 420-01	PCB ASSY, 1571	
252 069-01	SHIELD PLATE, BOTTOM	
252 070-01	INSULATION SHEET A	
252 160-01	SHEET COVER, IC	
252 083-01	FLOPPY DISK, NEWTRONICS	
252 092-01	FLOPPY DISK, ALPS	
310 513-01	DISK DRIVE CHASSIS	
252 165-01	DISK DRIVE CHASSIS ALPS	
PCB ASSEMBLY 1571 STAND ALONE DISK DRIVE		
901 435-02	IC 6502A 2MHZ CPU	U1
310 654-01	23256 32K + 8 ROM	U2
251 828-01	64H156 CUSTOM GATE ARRAY	U6
251 829-01	64H157 CUSTOM GATE ARRAY	U5
251 853-01	R/W HYBRID	U7
310 651-01	WD 1770-00 FDC	U11
390 077-01	74F32 QUAD OR	U12
310 653-01	65SC22A (2MHZ)	U4,9
252 034-02	PST 520D VOLT DET	U21

318 011-03	656 (2MHZ)	U20
251 637-05	2016 20LB 2Kx8	U3
251 828-02	Custom GAZE ARRA	U6
325 566-01	CRYSTAL MODULE 16MHZ	Y1
310 657-01	TRANSISTOR MPSU51 PNP	Q1

PCB ASSEMBLY 1571  
STAND ALONE DISK DRIVE

902 410-10	RESISTOR PACK 1 K 10 PIN	RP1
251 842-02	EMI FILTERS 100 PF	EM1-4
325 513-01	INDUCTOR 2.2 MHZ	L1
325 513-03	INDUCTOR 100 MHZ	L3
252 166-01	CONNECTOR 6 PIN DIN	CN6,8
252 145-10	CONNECTOR 10 PIN DUAL RT ANG CNZ	

## REVISIONS

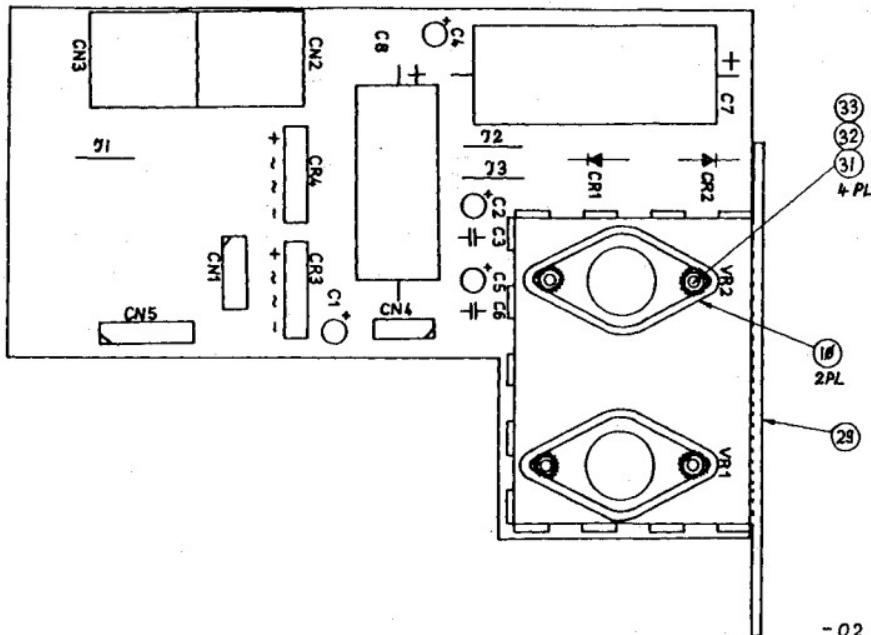
LTR ZONE

DESCRIPTION

DA

APPROVED

SEE SHEET 1

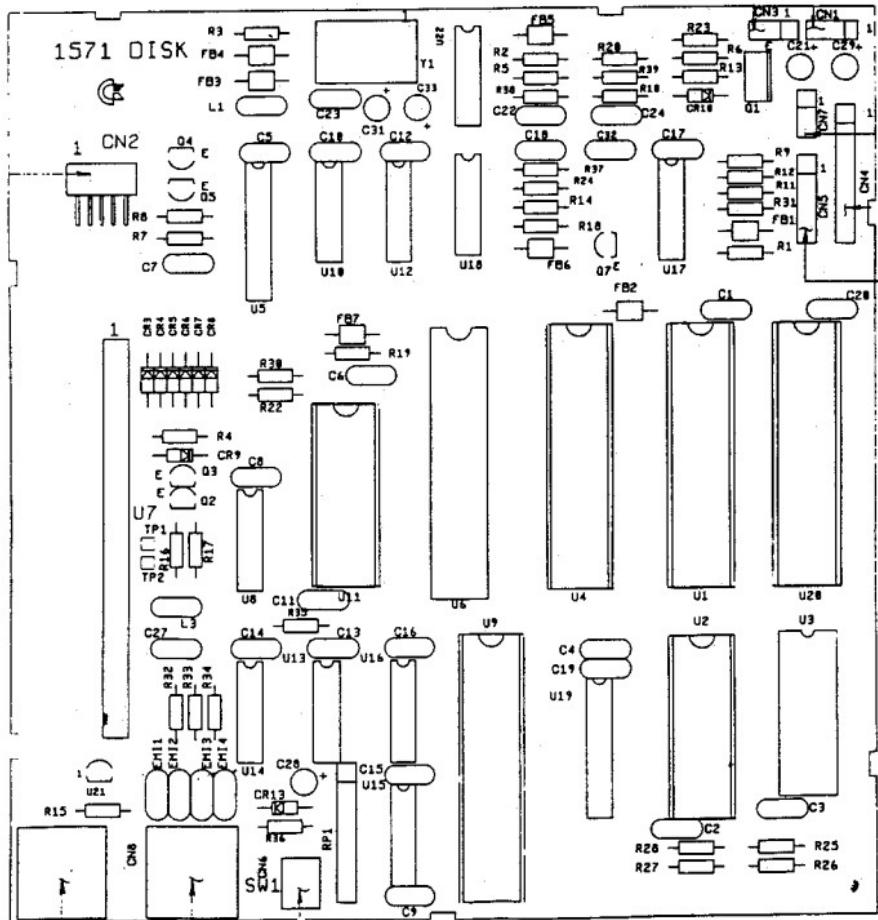


-02 SHOWN

UNLESS OTHERWISE SPECIFIED TOLERANCES ON DECIMALS			DRAWN BY <i>B. G.</i> DATE 10-19-86
X	XX	XXX	
1	2	3	CHKD <i>M. Hayes</i> 10-19-86
ENGR			APPR
MATERIAL /			USED ON
FINISH /			NEXT ASSY
SIZE B			REV A
SCALE NONE			SHEET 4 OF 4

**commodore**

PCB ASSY  
POWER SUPPLY  
1570



---

# **COMMODORE**

---

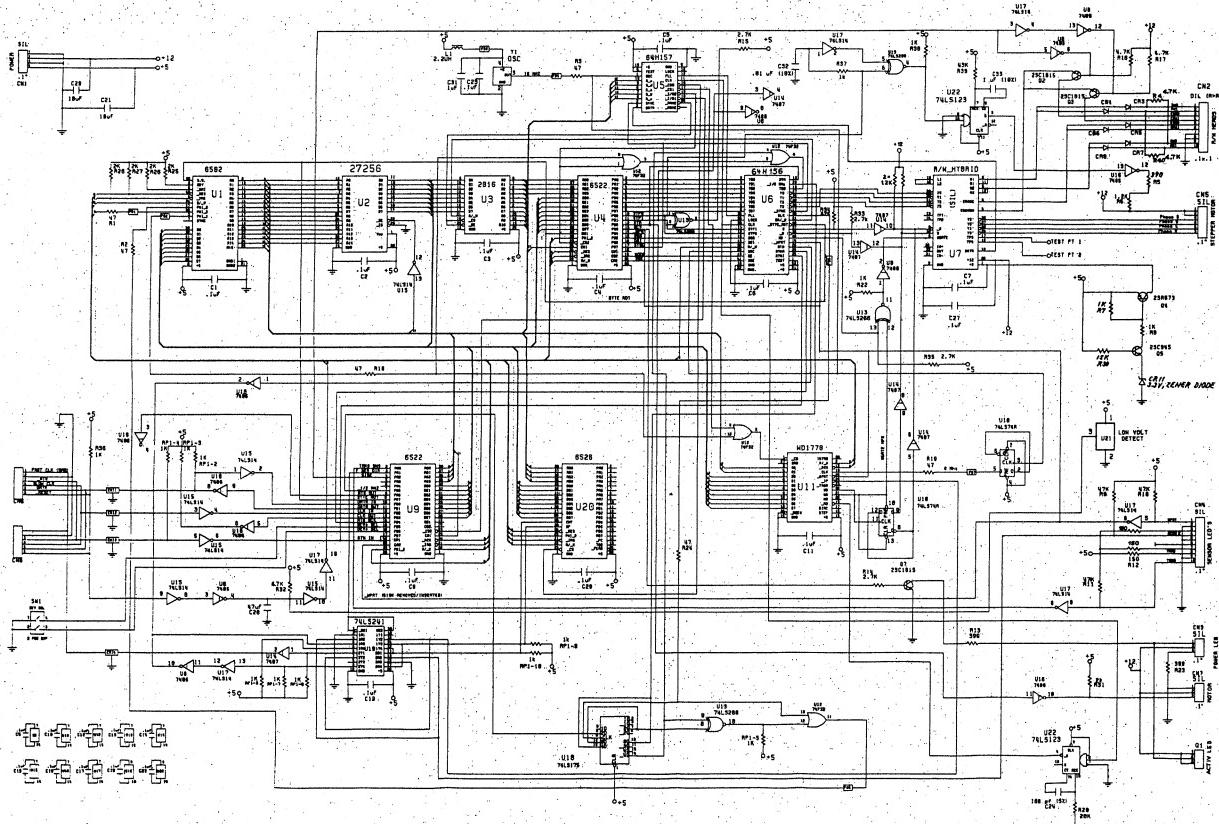
## **DISK DRIVE 1570/1571 - 1571 CR**

---

### **Technical Manual**

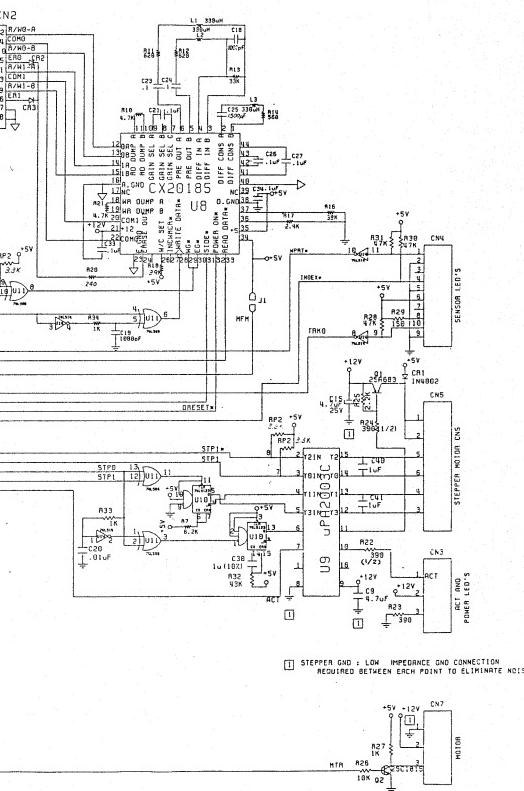
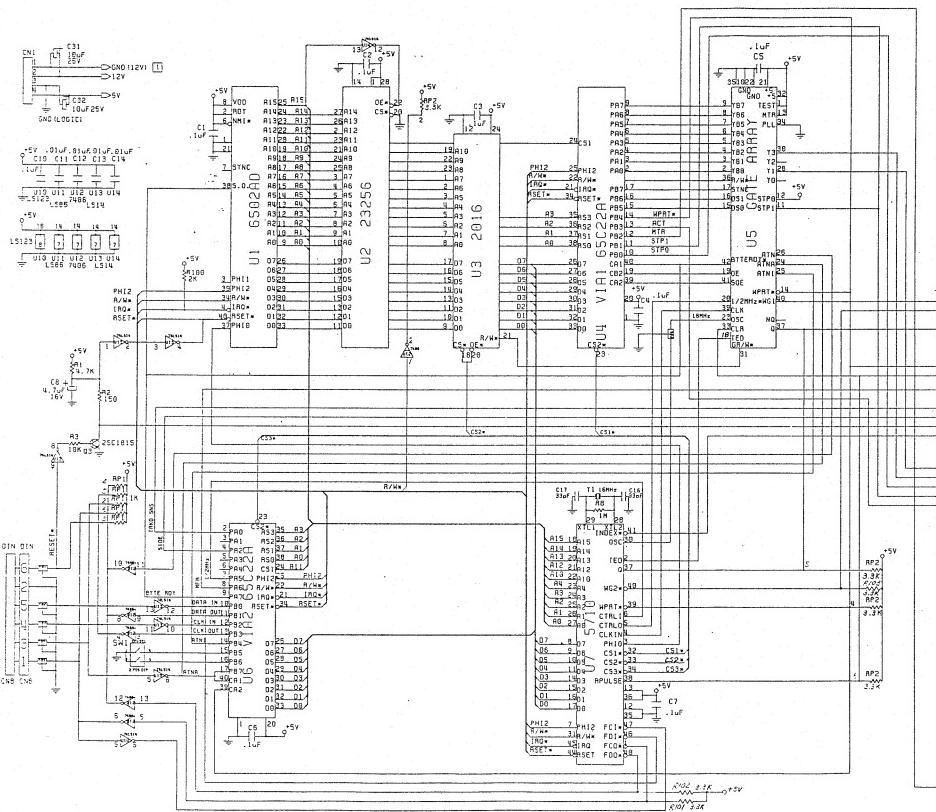
---

9/87



## VISIONS

NE	LTR	DESCRIPTION	DATE	APPROVED
	2	ADVANCED ENGINEERING RELEASE	6-28-86	St. Johnsen
	3	PILOT PRODUCTION RELEASE	1-6-87	J. J. Schaffert
	4	REVISED PER ECR 87023	4-26-87	F. L. Becker



**I STEPPER GND : LOW IMPEDANCE GND CONNECTION  
REQUIRED BETWEEN EACH POINT TO ELIMINATE NOISE**

DRAWN BY:	DATE	COMMODORE	
M. Kouzai	01-07-85		
CHKD:Nishizuka 0818-85			
ENGR:		SCHEMATIC	
APPR:	T-1	1571 CR DISK	
J			
USED ON NEXT ASSY			
1571	SIZE	REV	
CR	D	252305 3	
SCALE NONE		SHEET 1 OF 1	

QUANTITY REOD PER PART/DASH NO.	ITEM NO.	DS	PART NUMBER	DESCRIPTION	REF DES	END	NOTES	
	01							
	1							
	2	0	252305-01	SCHEMATIC, C-1571CR				
	3	B	252306-01	PCB, FABRICATION				
	4	B	252307-01	PCB, ARTWORK				
	5							
	6							
	7	B	901435-02	IC, CPU 6502-AD	U1			
	8	B	901437-02	VIA 6522A	U4,6			
	9							
	10	B	252371-01	FOC 5710	U7			
	11	B	251828-01	GATE ARRAY, 40PIN	U5			
	12	B	251828-02	GATE ARRAY, 48PIN	U5		SUBSTITUTE FOR ITEM 11.	
	13							
	14		318047-01	1571CR DOS 256K ROM	U2		Tacc<300,	
	15	B	251637-05	IC, 2076. (16K SRAM)	U3		Tacc<200	
	16							
	17							
	18							
	19	B	252308-01	IC, FDD READ/WRITE AMP	U8		SONY	
	20	B	252308-02	IC, FDD READ/WRITE AMP	U8		MOTOROLA. SUBSTITUTE FOR ITEM 19	
	21							
	22							
	23							
	24	B	901522-06	IC, 7406	U12			
	25		901521-30	74LS10	U13,14			
	26	I	-32	74LS86	U11			
	27	B	901521-49	IC, 74LS123	U10			
	28							
	29							
	30							
	31	B	251871-01	IC, HPA2003C	U9		NEC	
	32	B	251871-02	IC, IR2C19	U9		SHARP. SUBSTITUTE FOR ITEM 31.	
	33							
	34							
	35	A	902693-01	TRANSISTOR, 2SC1815	Q2,J			
	36	A	310657-01	TRANSISTOR, MPSU51	Q1		SUB FOR ITEM 37	
	37		252460-01	TRANSISTOR, 2SA683	Q1			
	38		252460-02	TRANSISTOR, 2SA684	Q1		SUB FOR ITEM 37	
commodore		TITLE	PCB ASSY, C-1571CR	DRAWN BY S.Ganapathy CHKD 20/07/2015 (3-20-15)	DATE 7-28-86 APPR. F	ENGR S.Ganapathy 3177	DATE 6-18-86 DRAWING NUMBER B 250470 SHEET 2 OF 5	REV 4

PART NO.	DESCRIPTION		REVISIONS		
	LTR	ZONE	DESCRIPTION	DATE	APPROV'D
250470-01	C	1	PCB ASSY, C-1571CR		
	2		ADVANCED ENGINEERING RELEASE	6-19-86	919-L
	3		PILOT PRODUCTION RELEASE	10-22-86	1-17-87
	4		REVISED PER ECO 870207 & 870228	7-13-87	A - DRAFT

1. SHEET OF SIZE

ASSY DWG

NOTES-UNLESS OTHERWISE SPECIFIED:

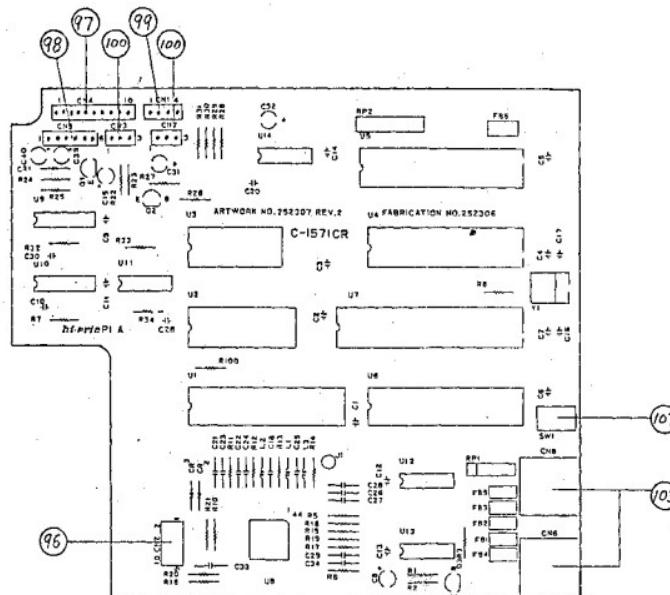
commodore	TITLE	PCB ASSY, C-1571CR	DRAWN BY: J. Ogawa	DATE 2-20-86	ENGR: S. Peterson	DATE 3-25-86	SHEET #	DRAWING NUMBER 250470
			CHGD BY: M. Shultz	3-20-86	APPR'D: H	3-17-87	B	SHEET 1 OF 5

QUANTITY REQD PER PART/DASH NO.	ITEM #	DS	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES
	01						
S 77 B	900461 -28		CAPACITOR, CERAMIC, 0.1UF 50V	⑧ C21,23,24,			C26,27,33,34 SUB. FOR ITEM 89
2 78 B	251069 -10		CAPACITOR, CERAMIC, 150.0PF 50V 10%⑧	C25			
S 79	900461 -04			1000PF	C18		SUB. FOR ITEM 80
2 80	900010 -23			10000PF	10%⑧ C19,18		
2 81	251072 -16			330PF	5%⑧ C16,17		
1 82	900010 -01			.01UF SOV	⑧ C11-18		
S 83	900010 -12		CERAMIC, .1UF 16V	⑧ C1-7,10 SUB. FOR ITEM 89			
1 84 B	900410 -09		TANTAL, .1UF 16V 20%⑧	C30			
3 85 A	900100 -11		ELECT., 0.7UF 25V	⑧ C8,P,13			
2 86 A	900100 -01		CAPACITOR, ELECT., 10UF 25V	⑧ C31,32			
2 87 B	252370 -01		CAPACITOR, ELECT., NON POLE 1UF 50V	⑧ C40,41			
S 88 B	252174 -05		CAPACITOR, CERAMIC, 1000PF	⑧ C19			SUBSTITUTE FOR ITEM 80
1 89 B	900010 -61		CAPACITOR, CERAMIC, 0.1UF 50V	C1-7,10,21,23,24,26,27,33,34			
3 90 B	252369 -39		COIL, INDUCTOR, 330uH	L1-3			
S 91 B	900402 -13		CAPACITOR, TANTAL, .1UF 35V 10%⑧	C30			SUBSTITUTE FOR ITEM 8A
S 92 B	252174 -07		CAPACITOR, CERAMIC, .01UF 50V	⑧ C11-18			SUBSTITUTE FOR ITEM B2
6 93 B	252173 -01		FERRITE BEADS	⑧ FB1-6			
1 94 B	251089 -20		CAPACITOR, CERAMIC, .01UF B, 50V	⑧ C20			
S 95	900461 -06		CAPACITOR, CERAMIC, 1500PF 50V	C25			SUB. FOR ITEM 78
1 96 B	252145 -01		HEADER ASSY, 10 PIN (DIL)	CN2			(GOLD FINISH)
1 97	325562 -10			10 PIN (SIL)	CN4		
1 98	-06			6 PIN (SIL)	CN5		
1 99	-04			4 PIN (SIL)	CN1		
2 100 B	325562 -03		HEADER ASSY, 3 PIN (SIL)	CN3,7			
101							
102							
2 103 B	252166 -01		CONNECTOR, 6PIN DIN	CN6,8			
104							
S 105	252173 -03		FERRITE BEADS	FB1-6			SUB. FOR ITEM 93
106							
1 107 B	252104 -02		DIP SWITCH 2-BITS (UPRIGHT)	SW1			
108							
109							
1 110 B	251313 -02		SOCKET, IC LOW-PROFILE 60PIN	U7			
1 111 B	900150 -03		SOCKET, IC LOW-PROFILE 20PIN	U2			
1 112 B	252076 -01		TUBE, INSULATION L'S				WHEN USE ITEM 36
commodore							
TITLE: PCB ASSY, C-1571CR				DRAWN BY: S. Ogawa	DATE: 2-26-86	ENGR: Electronique	PRINT: 6-18-86
				CHKD: <i>Plastech</i>	APPR: <i>H-1</i>		SHEET 2 OF 5
							REV: 4

QUANTITY NEEDED PER PART / DASH NO.	ITEM NO.	DS	PART NUMBER	DESCRIPTION	REF DES	REND	NOTES			
	61									
	39									
2	40	B	900850-16	DIODE, IN914	CR2, 3					
1	41	A	900750-02	DIODE, IN4002	CR1					
	42									
	43									
1	44	B	900557-01	CRYSTAL, 16 MHZ	Y1					
	45									
	46									
2	47	A	901550-09	RESISTOR, 130 1/4W 5%	R2, 29					
2	48		-20	10K	R3, 26					
	49									
1	50		-53	2K	R100					
1	51		-87	6.2K	R7					
1	52		-88	1M	R8					
3	53		-19	0.7K	R1, 10, 21					
2	54		-60	620	R11, 12					
1	55		-06	33K	R13					
1	56		-30	560	R14					
2	57		-57	390	R22, 23					
1	58		-18	2.2K	R25					
3	59		-01	1K	R27, 33, 34					
3	60		-22	67K	R28, 31, 30					
3	61		-02	3.3K	R101, 102, 103					
1	62	B	901550-99	RESISTOR, 43K 1/4W 5%	R32					
1	63	B	901550-85	RESISTOR, 2.4K 1/4W 5%	R17					
	64									
1	65	B	-21	RESISTOR, CARBON, 39K 1/4W 5%	R16					
	66									
1	67	B	-39	RESISTOR, CARBON, 3.9K 1/4W 5%	R18					
1	68	B	901550-29	RESISTOR, 240 1/4W 5%	R20					
	69									
	70									
1	71	B	901600-37	RESISTOR, 390 1/2W 5%	R24					
	72									
	73									
1	74	A	356190-02	RESISTOR PACK, 1K 1/8W 10%, 6PIN	RPI					
1	75	A	902442-27	RESISTOR PACK, 3.3K 1/8W 5%, 8PIN	RPI					
	76									
commodore		TITLE	PCB ASSY, C-1571CR	DRAWN BY: S. Ogawara CHKO 2/20/86	DATE: 8-20-86 S. Ogawara APPR:	ENGR: S. Ogawara APPR:	DATE: 6-10-86 S. Ogawara APPR:	SIZE: B SHEET: 3 OF 5	DRAWING NUMBER: 250470	REV: 4

## REVISIONS

LTR	ZONE	DESCRIPTION	DATE	APPROVED
SEE SHEET 1				



UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DEIMALS XX .XXX X.XX		DRAWN BY: <i>[Signature]</i> DATE: 6-16-74	commodore
X	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
MATERIAL:		USED ON:	NEXT ASSY:
PRINTED:			
SCALE: 1:1		SIZE: 250470	REV: 4
PCB ASSY, C-1571CR			
SCALENONE SHEET 5 OF 5			